

**UNCLASSIFIED**

**AD** **409 724**

**DEFENSE DOCUMENTATION CENTER**

**FOR**

**SCIENTIFIC AND TECHNICAL INFORMATION**

**CAMERON STATION, ALEXANDRIA, VIRGINIA**



**UNCLASSIFIED**

NOTICE: When government or other drawings, specifications or other data are used for any purpose other than in connection with a definitely related government procurement operation, the U. S. Government thereby incurs no responsibility, nor any obligation whatsoever; and the fact that the Government may have formulated, furnished, or in any way supplied the said drawings, specifications, or other data is not to be regarded by implication or otherwise as in any manner licensing the holder or any other person or corporation, or conveying any rights or permission to manufacture, use or sell any patented invention that may in any way be related thereto.

63 4-2

CATALOGED BY UDC 409724

AS AD No. \_\_\_\_\_

409 724

FTD-TT-63-457

# TRANSLATION

METHOD OF OBTAINING  
PERFLUODICARBONIC ACIDS

By

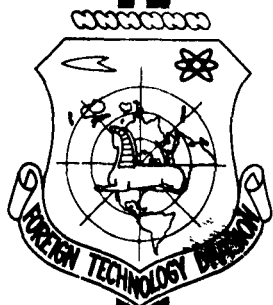
I. L. Knunyants, V. V. Shokina and Li Chu Yüan

## FOREIGN TECHNOLOGY DIVISION

AIR FORCE SYSTEMS COMMAND

WRIGHT-PATTERSON AIR FORCE BASE

OHIO



DDC  
RECEIVED  
JUL 22 1963  
RESOLVED  
TISIA D

## UNEDITED ROUGH DRAFT TRANSLATION

METHOD OF OBTAINING PERFLUODICARBONIC ACIDS

BY: I. L. Knunyants, V. V. Shokina and Li Chu Yuan<sup>"</sup>

English Pages: 3

SOURCE: Russian Patent Nr. 127654, (Appl. Nr. 630762/23,  
12 June 1959), 1960, pp 1-2

THIS TRANSLATION IS A RENDITION OF THE ORIGINAL FOREIGN TEXT WITHOUT ANY ANALYTICAL OR EDITORIAL COMMENT. STATEMENTS OR THEORIES ADVOCATED OR IMPLIED ARE THOSE OF THE SOURCE AND DO NOT NECESSARILY REFLECT THE POSITION OR OPINION OF THE FOREIGN TECHNOLOGY DIVISION.

PREPARED BY:

TRANSLATION DIVISION  
FOREIGN TECHNOLOGY DIVISION  
WP-AFB, OHIO.

## Method of Obtaining Perfluodicarbonic Acids

By

I. L. Knunyants, V. V. Shokina and Li Chu Yuan

Perfluorized dicarbonic acids can be widely used in reactions of polycondensation for the obtaining of noncombustible heat-resistant polymers--polyesters and polyamides.

However, up to the present time such perfluorized acids were difficult to obtain, since they are obtained with very low yields by electrochemical fluorization of the respect dicarbonic acids or oxidation of unsaturated fluorocarbons, which are also little accessible.

There is also known the obtaining of perfluoricarmonic acids by the oxidation of perfluorized diolefins by potassium permanganate. However, the obtaining of perfluorized dicarbonic acids by this method from adipic and higher acids is not described in the literature.

For the purpose of obtaining by the method propose, perfluodicarbonic acids of the general formula  $\text{HOOC}(\text{CF}_2)_{4n+4}\text{COOH}$ , one subjects to oxidation by potassium permanganate  $\omega$ -perfluodiolefin with a number of carbon atoms equal to or greater than eight and the multiple four. It is recommended that one do the oxidising in an aqueous acetone solution at 20 to 25°. The yield of the acids are close to the theoretical.

Example. Perfluosebacic acid.

Into a three-necked retort provided with a stirrer, a trickling funnel, and a thermometer, one puts 150 ml of water, 150 ml of acetone, and 30 g of  $\text{KMnO}_4$ . To the reaction mixture one adds drop by drop while stirring and maintaining a temperature of 20 to 25°, 22.4 g of perfluorododecadiene-1,11 in 100 ml of acetone. The stirring goes on for five hours. The precipitate is filtered out and washed with hot water. The solution is decolorized by sulfurous gas, concentrated by evaporation to 70 ml, and acidified by 50-percent sulfuric acid. The perfluorocarbonic acid is extracted by ester. The yield of the acids amounts to 18 g (92% of the theoretical; melting point 160-161° (from water)).

Analogously from perfluorooctadiene-1,7 one gets perfluoradipic acid with a yield of 86%, melting point 134-135° (from toluene).

#### Object of Invention

A method of obtaining perfluorodicarboxylic acids by means of Oxidation of perfluoroolefins by permanganate of potassium, which is distinguished by the fact that for the purpose of obtaining acids of the general formula  $\text{HOOC}(\text{CF}_2)_n\text{COOH}$  one subjects to oxidation  $n$ -perfluoroolefin with the number of carbon atoms equal to greater than eight and the multiple four.

# DISTRIBUTION LIST

DEPARTMENT OF DEFENSE	Nr. Copies	MAJOR AIR COMMANDS	Nr. Copies
		AFSC	
		SCFDD	1
		DDC	25
		TDBTL	5
HEADQUARTERS USAF		TDBDP	2
		ASD (ASYIM)	2
AFCIN-3D2	1		
ARL (ARB)	1		
			:
OTHER AGENCIES			
CIA	1		
NSA	6		
DIA	9		
AID	2		
OTS	2		
AEC	2		
PWS	1		
NASA	1		
ARMY (FSTC)	3		
NAVY	3		
NAFEC	1		
RAND	1		
AFCRL (CRCLR)	1		